FIG. **6** is a cross-sectional view schematically illustrating an organic light-emitting display apparatus **1'** according to another embodiment of the present invention.

The organic light-emitting display apparatus **1'** is a bottom-emission type display apparatus. Reference numerals of elements of the organic light-emitting display apparatus **1'** shown in FIG. **6** that are the same as reference numerals of elements of the display apparatuses shown in FIGS. **4** and **5** are like elements of the display apparatuses shown in FIGS. **4** and **5**. The display apparatus shown in FIG. **6** may further include a transparent electrode layer **216** between the top gate electrode **217** and the second insulating layer **116**, a transparent electrode layer **226** between the auxiliary gate electrode **227** and the second insulating layer **116**, and a transparent electrode layer **236** between the second electrode **237** and the second insulating layer **116**. The top gate electrode **217**, the auxiliary gate electrode **227**, and the second electrode **237** may each form a double-layered electrode with the transparent electrodes **216**, **226**, and **236**, respectively.

In addition, a pixel electrode **256** of the light-emitting device **25** of the pixel area PXL may be included as a transparent electrode layer. The transparent electrode layers **216**, **226**, and **236** and the pixel electrode **256** are formed from the same layer with the same material and may include at least one selected from the group consisting of ITO, IZO, ZnO, In_2O_3, IGO, and AZO. Further, in an embodiment, a second pixel electrode **257** is formed on peripheral portions of the pixel electrode **256**. The second pixel electrode **257** may be formed from the same layer and with the same material as the top gate electrode **217**, the auxiliary gate electrode **227**, and the second electrode **237**.

FIG. **7** is a cross-sectional view schematically illustrating an organic light-emitting display apparatus **1"** according to another embodiment of the present invention.

The organic light-emitting display apparatus **1"** shown in FIG. **7** is a top-emission type display apparatus. Reference numerals of elements of the organic light-emitting display apparatus **1"** shown in FIG. **7** that are the same as reference numerals of elements of the display apparatuses shown in FIGS. **4** and **5** are like elements of the display apparatuses shown in FIGS. **4** and **5**. In FIG. **7**, the light-emitting device **25** is included in a top surface. Thus, an opening ratio or aperture may increase.

Thus far, the structure of the organic light-emitting display apparatus according to one or more embodiments of the present invention has been described. The organic light-emitting display apparatus according to one or more embodiments of the present invention has structural characteristics as follows.

First, as on-current increases by using a thin film transistor having a double gate structure including both the top gate electrode **217** and the bottom gate electrode **212**, a size of the transistor may be reduced, and an opening ratio or aperture may be increased.

In addition, since overlaps of the top gate electrode **217**, source electrode **219***a*, and drain electrode **219***b* are removed, and since overlapping areas of the source electrode **219***a* and the drain electrode **219***b* are removed by doping a partial area of the bottom gate electrode, an effect of parasitic capacitance may be removed. Therefore, a large-size high-resolution display may be operated by reducing parasitic capacitance in the thin film transistor.

In addition, since a channel length is reduced compared to a conventional oxide thin film transistor by forming the oxide semiconductor region **215**, which serves as a channel, on (or in an area between) the source contact region **214***a* and the drain contact region **214***b*, on-current of the thin film transistor may be increased.

In addition, since thicknesses of the top gate electrode **217** and the third insulating layer **118** may be increased without influencing on-current of the thin film transistor, resistances and capacitances of a gate line and a data line may decrease. Thus, a large-size high-resolution display may be operated.

In addition, as the organic light-emitting display apparatus is manufactured by combining an oxide thin film transistor with excellent current leakage suppressing characteristics and a silicon thin film transistor with excellent electron mobility, pixels may be firmly designed. That is, the oxide thin film transistor may be used in a part where current leakage needs to be suppressed, and the silicon thin film transistor may be used in a part where a large on-current is needed. The first transistor **21** of one or more embodiments of the present invention may be applied to a part where current leakage suppressing characteristics and a large on-current are both needed.

Lastly, as thicknesses of the first insulating layer **113** and the second insulating layer **116** may be reduced, a capacitor having high capacity may be formed by including a first electrode **234** and a second electrode **237**. In addition, a double capacitor may be formed by using the first electrode **234**, the second electrode **237**, and the third electrode **239**. Thus, capacity of the capacitor may be increased.

As described above, according to the one or more of the above embodiments of the present invention, a thin film transistor (TFT) substrate, a display apparatus, and a method of manufacturing a TFT array substrate may decrease parasitic capacitance and increase on-current of TFTs.

It should be understood that the example embodiments described herein should be considered in a descriptive sense only and not for purposes of limitation. Descriptions of features or aspects within each embodiment should be considered as available for other similar features or aspects in other embodiments.

While one or more embodiments of the present invention have been described with reference to the figures, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims and their equivalents.

What is claimed is:

1. A thin film transistor array substrate comprising:

a substrate;

a bottom gate electrode comprising a gate area doped with ion impurities and undoped areas on left and right sides of the gate area;

an active layer on the bottom gate electrode with a first insulating layer therebetween and comprising a source contact region, a drain contact region, and an oxide semiconductor region;

a top gate electrode on the active layer with a second insulating layer therebetween; and

a source electrode in contact with the source, contact regign and a drain electrode in contact with the drain contact region, the source electrode and the drain electrode being on the top gate electrode with a third insulating layer therebetween,

wherein the oxide semiconductor region is between the source contact region and the drain contact region.

2. The thin film transistor array substrate of claim **1**, wherein the gate area does not overlap the source contact region or the drain contact region.